ABSTRACT

A method and apparatus for determining a user's Respiratory Quotient (RQ) using just measured O_2 and CO_2 concentrations without use of a flow meter. The RQ is determined by measuring the user's real-time inspired O_2 concentration (INS O2) and end tidal O_2 concentration (ETO2) and measuring the user's real-time inspired CO_2 concentration (INS CO2) and end tidal CO_2 concentration (ETCO2), and then determining the user's RQ from the measured INS O2, ETO2, INS CO2, and ETCO2 values in accordance with the following equation: RQ= (ETCO2 – INS CO2) / (INS O2 – ETO2). In order to avoid error introduced by the flow rate, the measurement steps are preferably performed while the user is in a resting condition. Also, ETCO2 is preferably measured as the maximum CO_2 value in a breath cycle of the user, while INS CO2 is preferably measured as the minimum CO_2 value in a breath cycle of the user. Similarly, ETO2 is preferably measured as the minimum O_2 value within a breath cycle of the user, while INS O2 is measured as the maximum O_2 value within a breath cycle of the user. On the other hand, the values of INS CO2 and ETCO2 also may be determined in accordance with the invention by analysis of a CO_2 waveform of a breath cycle of the user and the values of INS O2 and ETO2 determined by synchronizing timing of the O_2 waveform of a breath cycle of the user with the CO_2 waveform and sampling INS O2 and ETO2 values simultaneously with sampling of complementary CO_2 values determined by analysis of the CO_2 waveform. The RQ measuring device may include the oxygen and CO_2 sensors in a mainstream or sidestream configuration.